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PARANORMAL AND RELIGIOUS BELIEFS MAY BE MEDIATED DIFFERENTIALLY BY SUBCORTICAL AND CORTICAL PHENOMENOLOGICAL PROCESSES OF THE TEMPORAL (LIMBIC) LOBES[1]

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Summary.—The vectorial hemisphericity concept predicts that endorsements of beliefs in paranormal phenomena are associated with elevated subcortical (complex partial epileptic-like signs) temporal lobe experiences while endorsements of religious beliefs are associated with experiences of the right (cortical) hemispheric equivalent (the sensed presence) of the linguistic sense of self. Partial correlation analyses, which removed the expected shared variance, supported this hypothesis for 400 men and 400 women; religious affiliation did not contribute any statistically significant influence. However, agreements with extreme religious beliefs, such as killing others in God's name, were associated with weekly church attendance and were primarily endorsed by men but not by women.

Within the normal population, elevations in the report of complex partial epileptic-like signs (CPES) have been moderately associated with endorsement of paranormal beliefs (e.g., reincarnation, extraterrestrial aliens are responsible for UFOs) but not with the endorsement of traditional religious beliefs. On the other hand, experiences of a sensed presence (cosmic consciousness, spiritual being, god) are positively correlated with scores that imply religious beliefs as well as those that imply paranormal beliefs (Persinger & Makarec, 1990, 1992). The neuropsychological bases for this anisotropic association between these two pairs of phenomenologies and beliefs may be explained by the models of Edelman (1989) and MacLean (1990). Both authors assume that the sense of self and awareness are the result of comparisons between interoceptive (limbic) and exteroceptive (cortical) processes.

According to the model of vectorial hemisphericity (Persinger, in press), the most labile region of the human brain involves the mesiobasal structures (primarily amygdala-hippocampus) of the temporal lobes. Their stimulation facilitates the attribution of personal meaning (widened affect) to unusual, odd, or infrequent perceptions, or to novel linguistic patterns (e.g., poetry, metaphorical writing). If the neural stimulation generalizes to the temporoparietal cortices, then experiences concerning the sense of self or its nonlinguistic equivalent (the sensed presence or ego-alien intrusion experience) are expected; the latter would be attributed to extrapersonal life forms (spir-

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its, gods, and more recently extraterrestrial intelligences) and could be the primary phenomenological basis for traditional religious beliefs.

If this general sequence of neurocognitive events occurs within the normal brain, then phenomenology associated with the intrinsic stimulation of the subcortical temporal lobes should be strongly and significantly correlated with measures of paranormal beliefs but not with measures of religious beliefs. If stimulation of the temporoparietal cortices is frequently preceded by activation of the mesiobasal structures and these cortices contribute to experiences that encourage religious beliefs, then phenomenology concerning a sensed presence should be correlated with both traditional religious and paranormal beliefs. However, if the expected shared variance between complex partial epileptic-like signs (CPES) and a history of sensed presences is accommodated, then only the former should be significantly associated with paranormal beliefs and only the latter should be associated with religious beliefs.

If these processes are a fundamental property of the human brain, then the relationship should be present even after covariation for religious affiliation. Considering the limitations of psychometric inferencing and the substantial individual differences in both interpretation of test items and experiences, the effect sizes should be typical of sociological phenomena and should explain no more than between 5% and 20% of the variance. In a large sample, individual variance would constitute stable noise and the primary characteristic of the aggregate should emerge.

To test this hypothesis, the complex partial epileptic-like sign cluster, the sensed presence cluster (Persinger & Makarec, 1992), and two belief scales (seven items each), traditional religious beliefs (such as "I believe there is a God" and "God has healed one of my family on at least one occasion") and paranormal beliefs (such as "Although I am not sure, there is a good possibility that I have lived in a previous life" and "Alien intelligence is probably responsible for UFOs") (Persinger & Makarec, 1990), were obtained from the Personal Philosophy Inventories of 400 men and 400 women who had been enrolled in first-year psychology courses over a 10-year period (according to an item that reflected handwriting preference 61 men and 40 women were sinistrals); the median ages for both groups were 22 years (range 18 to 50 years). To satisfy the requirement for internal replication of any patterns and because there is accumulating evidence of fundamental differences in the neurocognitive processes by which men and women solve problems and attribute causality (Persinger & Makarec, 1991), responses of the two genders were analyzed separately. All analyses were completed by SPSS^X software on a VAX 4000 computer.

Zero-order correlations (any $r > 0.17$, $p < .01$) for men and women, respectively, indicated the following relationships: complex partial epileptic-like signs and religious beliefs (0.15; 0.08), paranormal beliefs (0.33;

0.37) and presence (0.43; 0.39), presence and religious beliefs (0.26; 0.22), paranormal beliefs (0.22; 0.23), and religious beliefs and paranormal beliefs (0.07; 0.07). This confirmed the general hypothesis.

The partial correlations supported the specific hypothesis that when the shared variance between complex partial epileptic-like signs and presence was accommodated the specific association between the endorsed epileptic-like signs and paranormal beliefs and between sensed presence and religious beliefs would be clear. When complex partial epileptic-like signs was held constant the correlations between presence and paranormal beliefs decreased to 0.08 and 0.10 for men and women, respectively, but remained significant (0.22 and 0.20) for religious beliefs. When the variance associated with experiences of a sensed presence was held constant, the correlations between complex partial epileptic-like signs and paranormal beliefs were 0.27 and 0.31 for men and women, respectively, but decreased to 0.03 and −0.01 for religious beliefs. There were no statistically significant differences between any coefficients for the men and the women. [Hand calculations for significant differences between correlation coefficients indicated that, for this size of population, any change of 0.13 in a coefficient was statistically significant at the $p < .01$ level.]

Covariance for both the other phenomenological cluster and religious affiliation (Roman Catholic: 55%, Protestant: 30%, or other: 15%) showed partial correlations of 0.24 and 0.26 for men and women between a history of sensed presence and religious beliefs and correlations of 0.09 and 0.11 with paranormal beliefs. On the other hand, covariance for these variables gave correlations of 0.27 and 0.30 between paranormal beliefs and complex partial epileptic-like signs but no significant association (0.04; −0.01) between this cluster and religious beliefs.

If this model is internally consistent, then the strongest associations that are evident in complex partial epileptic populations should be shown in this normal population; the experience of fear and its common correlate, phobias, is frequently associated with electrical foci in mesiobasal temporal lobe structures (Makarec & Persinger, 1990). The logical prediction that our cluster of fear or phobia (Persinger & Makarec, 1990) items ($n = 5$) should be correlated only with complex partial epileptic-like signs for men (0.25) and women (0.24) [even when the sense of presence was held constant] was evident for men (0.20) and women (0.24). The correlations with presence when endorsement of the epileptic-like signs was held constant were 0.06 and −0.02, respectively.

In light of the associations between beliefs and behaviors and the numbers of human beings who have been and are being killed as a consequence of extreme religious beliefs, the contributions of the two pairs of phenomenological clusters and beliefs to extreme ideas, e.g., "If God told me to kill,

I would do it in his name" and "Most people should be guided to ensure their spiritual development," were estimated. For the men and women, the zero-order correlations were extreme beliefs (cluster of five items) and religious beliefs (0.50, 0.46), paranormal beliefs (0.10, 0.08), sensed presence (0.34, 0.23), and complex partial epileptic-like signs (0.23, 0.29). Partial correlations after covariance for any or all three of these variables did not significantly reduce the association between religious beliefs and extreme beliefs.

Mean scores for the clusters of items that composed extreme beliefs did not display statistically significant sex differences and were not associated with denomination; however, they were associated with frequent (at least once per week most months) church attendance. Multiple regressions for agreement with "guidance to ensure spiritual development" as a function of items that involved (a) frequent church attendance, (b) a religious experience, and (c) visitation by a spiritual being (sensed presence) showed a multiple r of 0.34 for the men and 0.35 for the women ($F_{2,397} = 28.44$ and 39.37, respectively, $p < .001$); the sensed presence item did not enter the equations.

Hierarchical loglinear analysis indicated that 63% of men and women who attended church weekly (compared to 32% who did not) agreed that people required guidance for spiritual development (*post hoc* $\chi^2 = 81.87$, $p < .001$; $\Phi = 0.29$); there was no differential sex effect. Although endorsement of killing in God's name was more frequent ($p < .001$) for people who attended church weekly, hierarchical loglinear analysis and subsequent chi-squared verification indicated that the effect was due primarily to the men; 24% of men who regularly attended church endorsed this item while only 6% of men who did not attend church regularly endorsed this item ($\chi^2 = 27.07$, $p < .001$; $\Phi = 0.25$); there was no significant contribution from denomination.

Paranormal and religious beliefs are unsubstantiated affirmations by which normal people attribute causal sources, explanation, and structure to their cosmos. Considering the ultimate egocentric manner by which the individual brain is organized, experience (when considered as a time-series variable) should primarily determine the belief; experience would be a function of the reinforcement history and which portions of the brain are most frequently stimulated. In the present sample, extreme religious beliefs that could result in significant alteration of other people's liberties appear to be secondary to general religious beliefs and may be encouraged by unspecified psychosocial factors that accompany frequent church attendance. If extreme religious beliefs are simply neurocognitive processes (Persinger, 1987) that reduce anxiety concerning the dissolution of the sense of self (death), then maintenance of these beliefs, even at the expense of others, becomes a mundane and dangerous consequence.

One would predict that any sociobiological process that preferentially activates temporal lobe subcortical activity, such as an episode of hypoxia, mild brain injury, or maintained childhood stress, should facilitate paranormal beliefs given the vulnerability of the subcortical temporal lobe structures. Any sociobiological process that preferentially encourages right temporoparietal intrusions into the left hemisphere because certain operations (such as marked linguistic competency or skill for sequential processing) maintain its chronic activation should facilitate an enhanced self-concept (egocentrism), religious beliefs, and their extreme forms. As predicted, more (12%) of the right-handed males (who as a population should display the greatest egocentrism and extreme beliefs) said they would kill in God's name while only 6% of the left-handed men endorsed this statement [for comparison, 6% and 2% of right- and left-handed women, respectively, agreed with this statement ($\chi_3^2 = 12.39$, $p < .01$)].

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